

HIV 101-Fundamentals of HIV/AIDS

Prepared by the
HIV/AIDS Program



NORTH DAKOTA
DEPARTMENT *of* HEALTH

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2. HIV/AIDS statistics
3. HIV/AIDS in the news



What is HIV/AIDS?

What is HIV?

- Human Immuno-deficiency Virus
- The virus attacks specific immune cells called CD4+ T-cells.
- The virus high-jacks the host cell to produce more of itself, thus killing the host cell.
- The genetic material of the virus is integrated into the host cell DNA.

What is AIDS?

- **Acquired Immuno Deficiency Syndrome**
- It is characterized by a distinct weakening of the immune system.
- AIDS is diagnosed when CD4+ T-cells are ≤ 200 cells per μL or $\leq 14\%$, or when an opportunistic infection (i.e. Tuberculosis) is diagnosed.

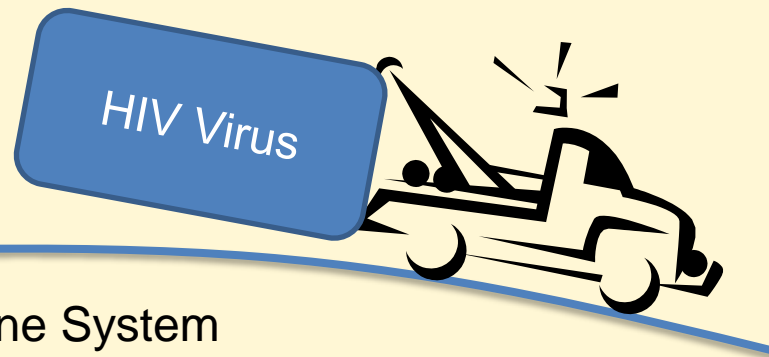
Normal Immune System



Immune System
CD4 cells

Before HIV infection

Few to no symptoms



Immune System
CD4 cells

Within the first months to years of HIV infection

Symptoms starting to appear:

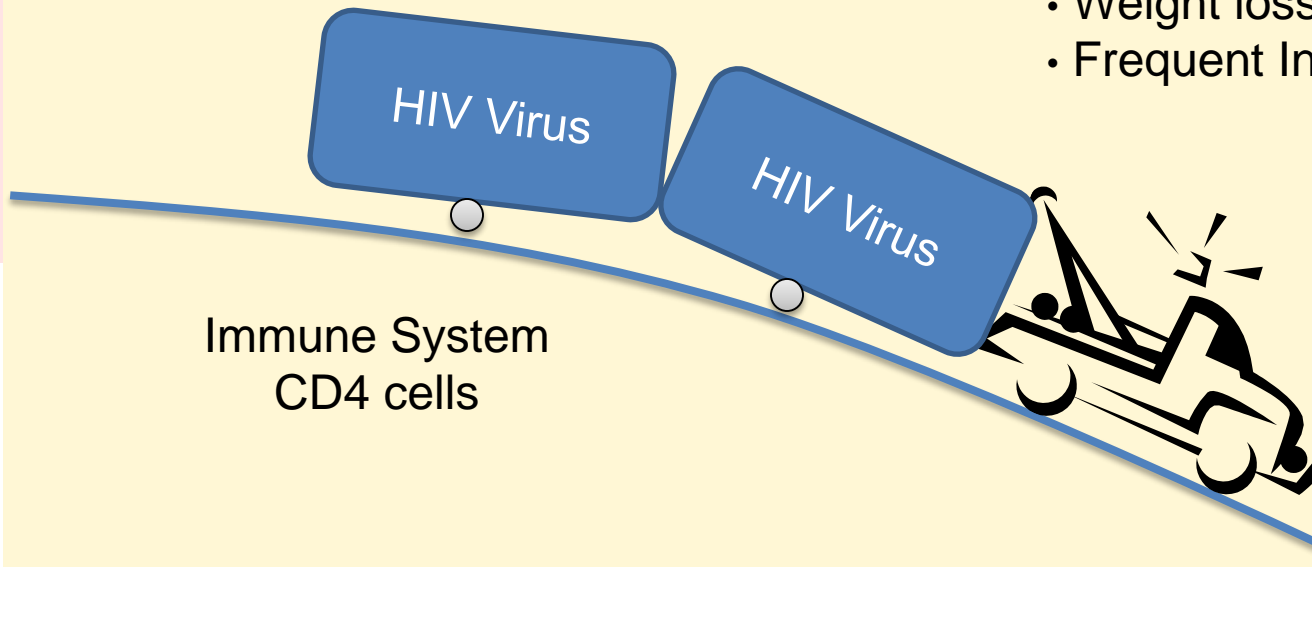
- Fatigue
- Weight loss
- Frequent Infections

HIV Virus

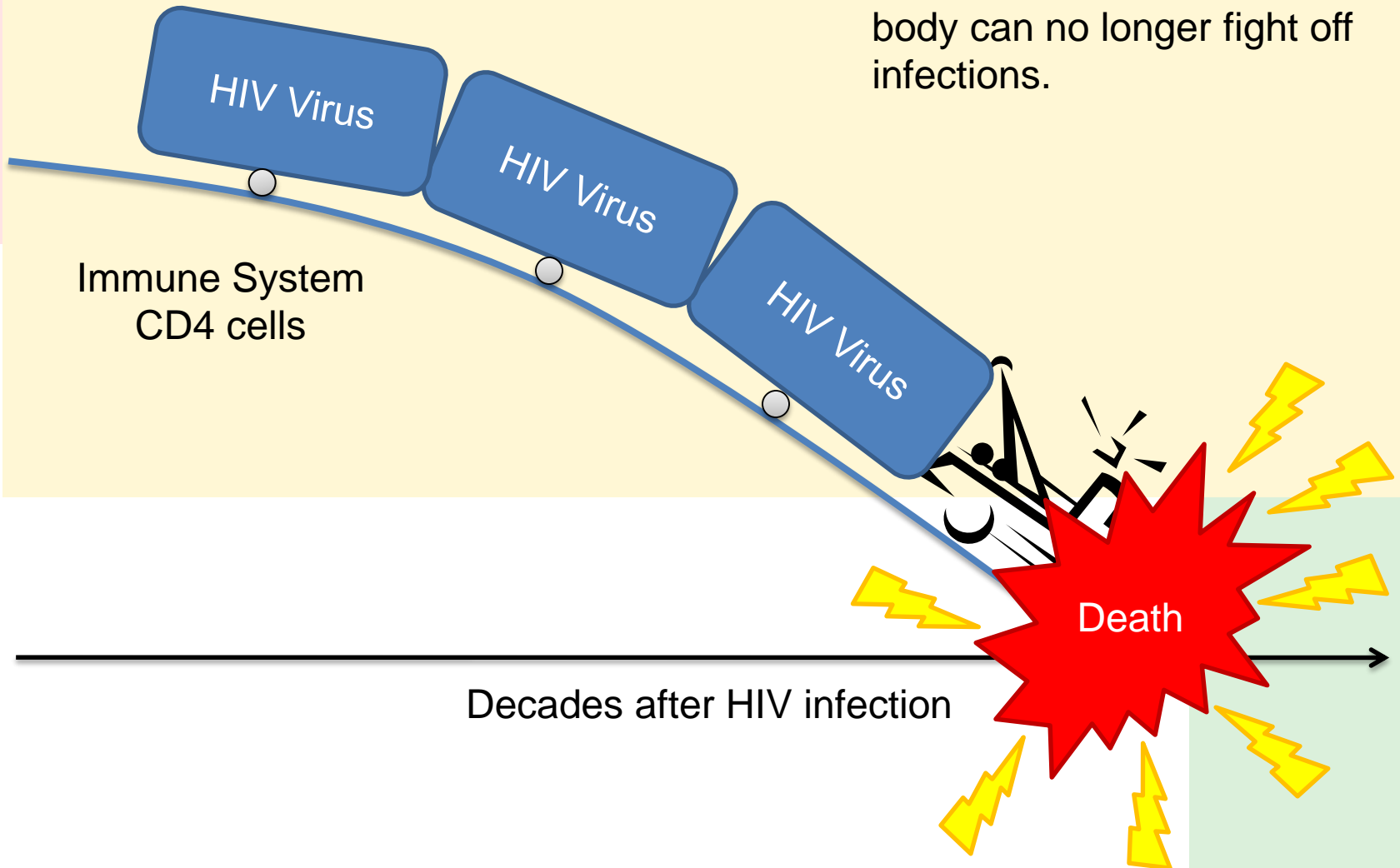
HIV Virus

Immune System
CD4 cells

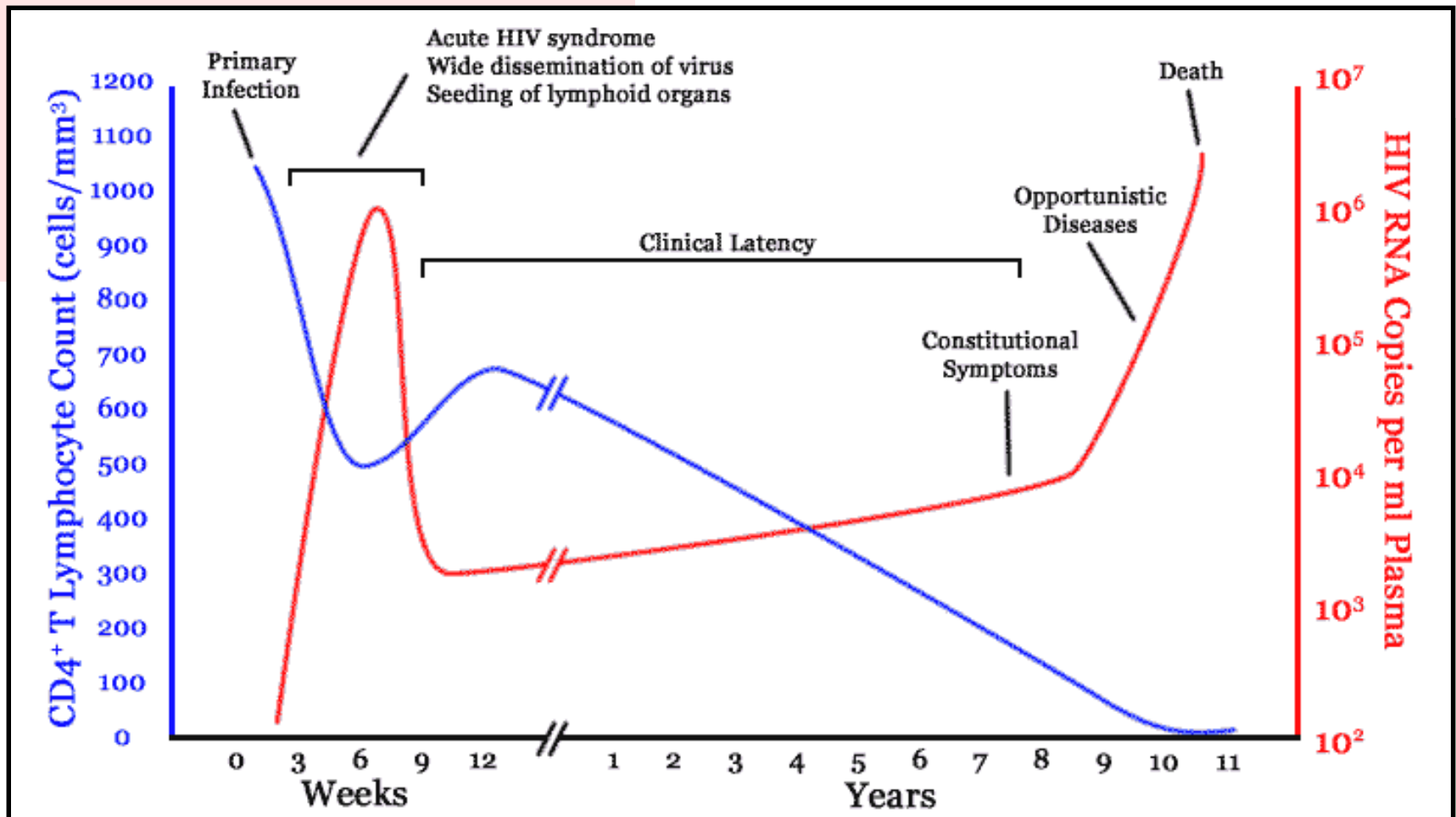
Years after HIV infection



The immune system becomes so weak that the body can no longer fight off infections.



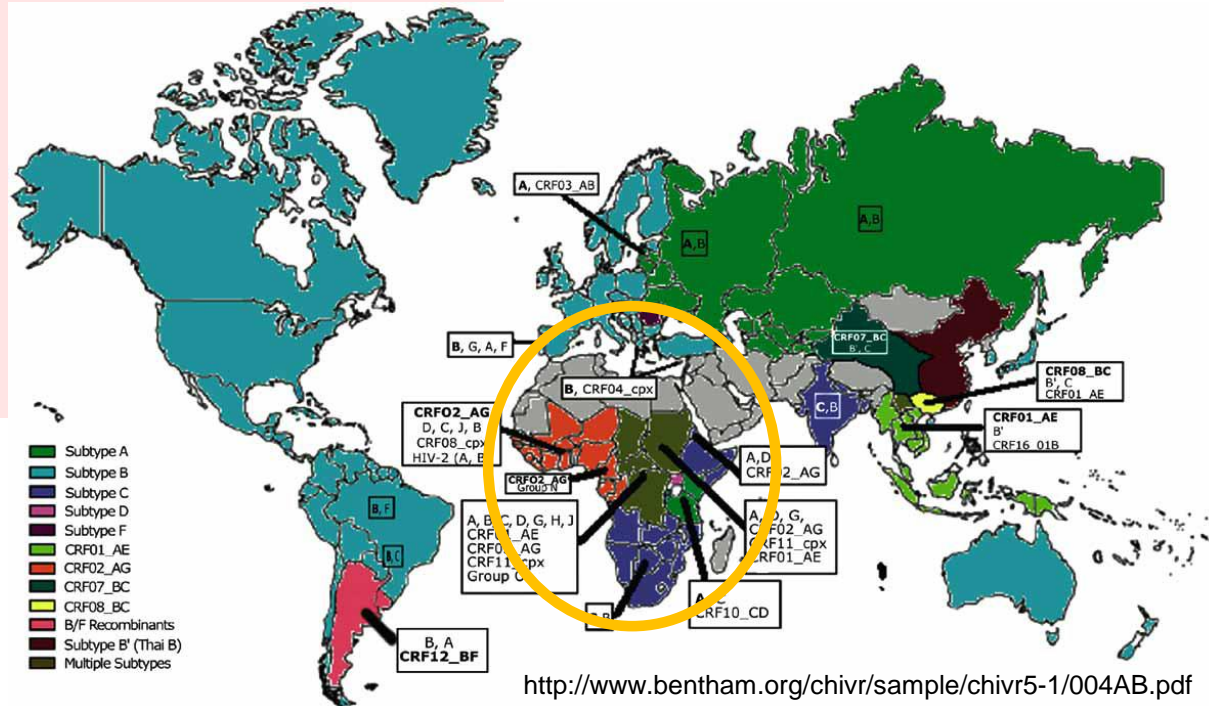
Disease Progression



Acute Infection

- Acute HIV Infection (AHI) refers to the initial period after infection.
- Symptoms will appear usually 1-4 weeks after infection and include:
 - fatigue, fever, malaise, headache,
 - muscle aches, rash, sore throat,
 - swollen lymph glands

Where Did HIV Come From?



- The most genetic diversity among HIV strains is seen in central and western Africa
- This suggests that HIV has been present in these regions longer than anywhere else

A bit of history

Sometime between 1884 and 1924 – HIV likely transfers to humans in Africa

1970s – African doctors see more cases of “wasting disease” and HIV likely enters the US

1981 – detected in New York and California in gay men first, then IDU

1983 – 3000 cases of AIDS identified in US, 1000 deaths

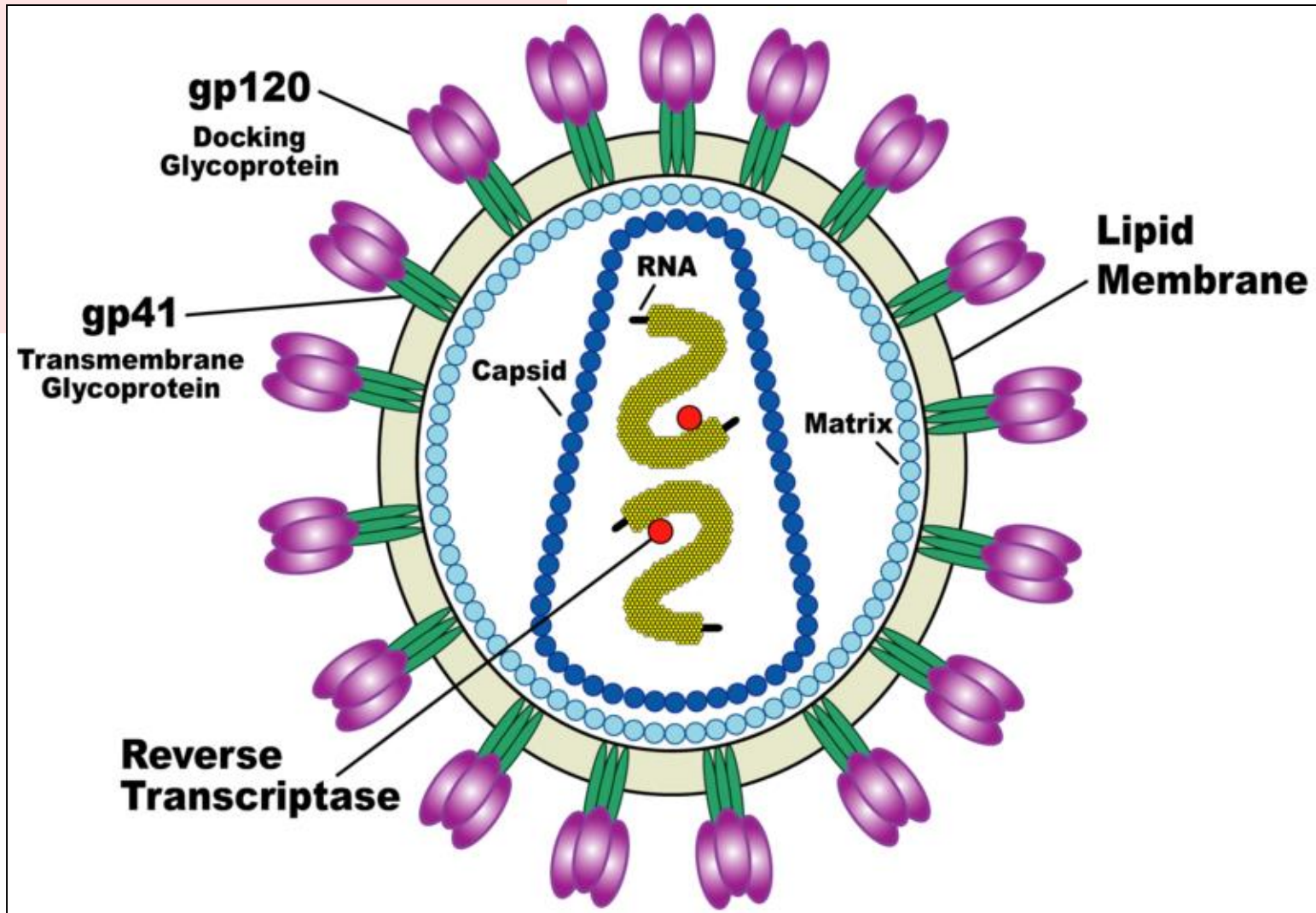
1984 – HIV identified as infectious agent

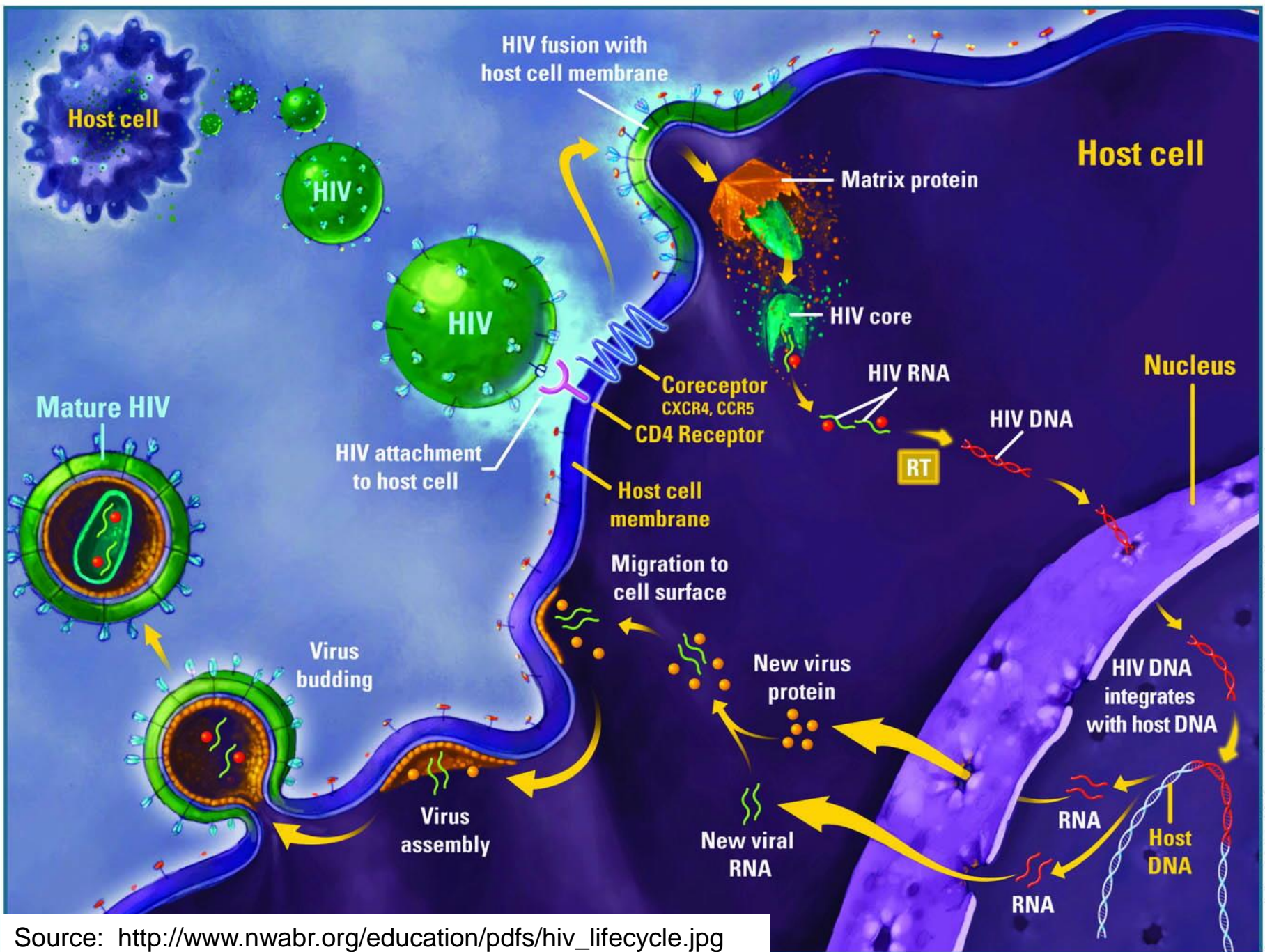
1985 – first HIV test available for screening

1987 – AZT is first drug developed to treat AIDS

1996 – Highly active antiretroviral therapy (HAART) is implemented, using at least 3 types of ARV drugs

The Virus





Source: http://www.nwabr.org/education/pdfs/hiv_lifecycle.jpg

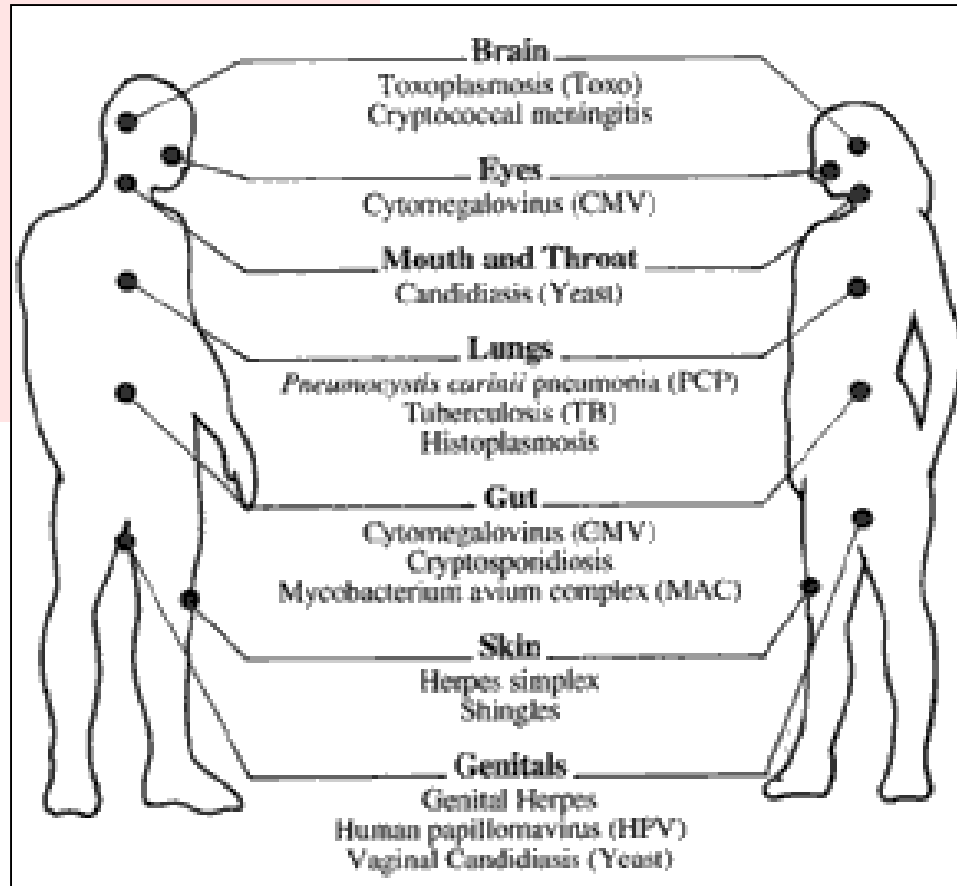
HIV/AIDS Facts

- Outside the body, HIV is not very stable and chances of infection are basically nil.
- Once infected with HIV, the virus does not go away from the body.
- There is no cure for HIV yet, but medication can slow the progression of the disease.
- People do not die of HIV alone, they generally die from opportunistic infections because of their crippled immune system.

Opportunistic Infections

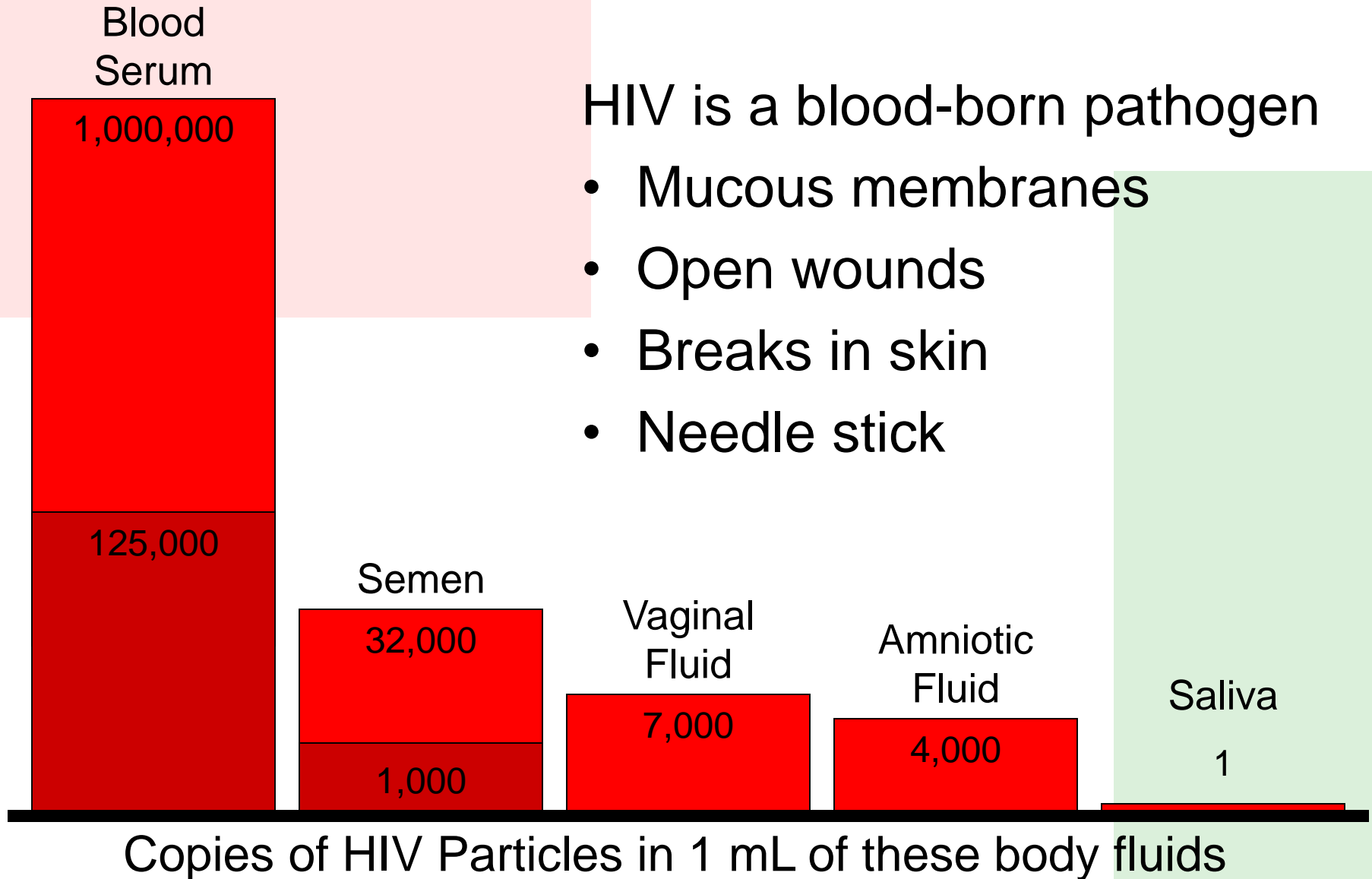
- Some examples are:
 - Tuberculosis
 - Recurrent pneumonia
 - *Pneumocystis jirovecii* pneumonia (aka PCP)
 - Wasting syndrome
 - Candidiasis of trachea, bronchi or lungs
- The most current list of opportunistic infections can be found here:
<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5710a2.htm>

Opportunistic Infections



<http://www.aegis.com/topics/oi/>

How is HIV Transmitted?

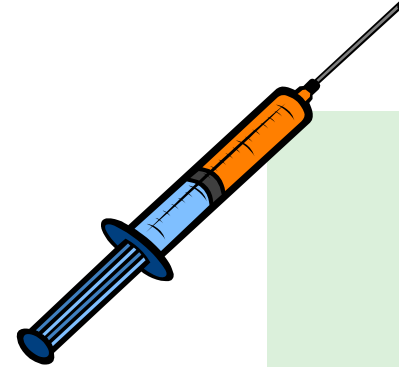


HIV is a blood-born pathogen

- Mucous membranes
- Open wounds
- Breaks in skin
- Needle stick

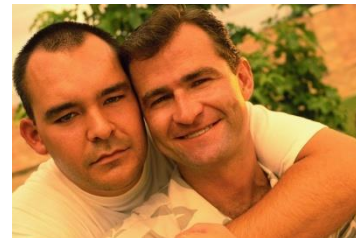
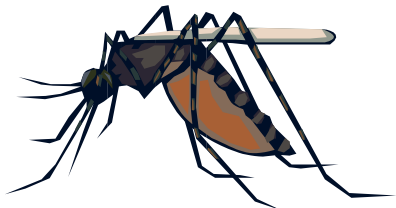
Most Common Modes of Transmission

- Sexual Contact
 - Male-to-male (MSM)
 - Heterosexual
- Blood Exposure
 - Injecting drug use (IDU)
 - Occupational exposure
 - Organ transplant
 - Blood/blood products transfusion
- Perinatal
 - Before or during birth
 - Breastfeeding



How HIV is NOT Transmitted

- Hugging
- Shaking hands
- Sharing eating utensils
- Touching toilet seats
- Bug bites



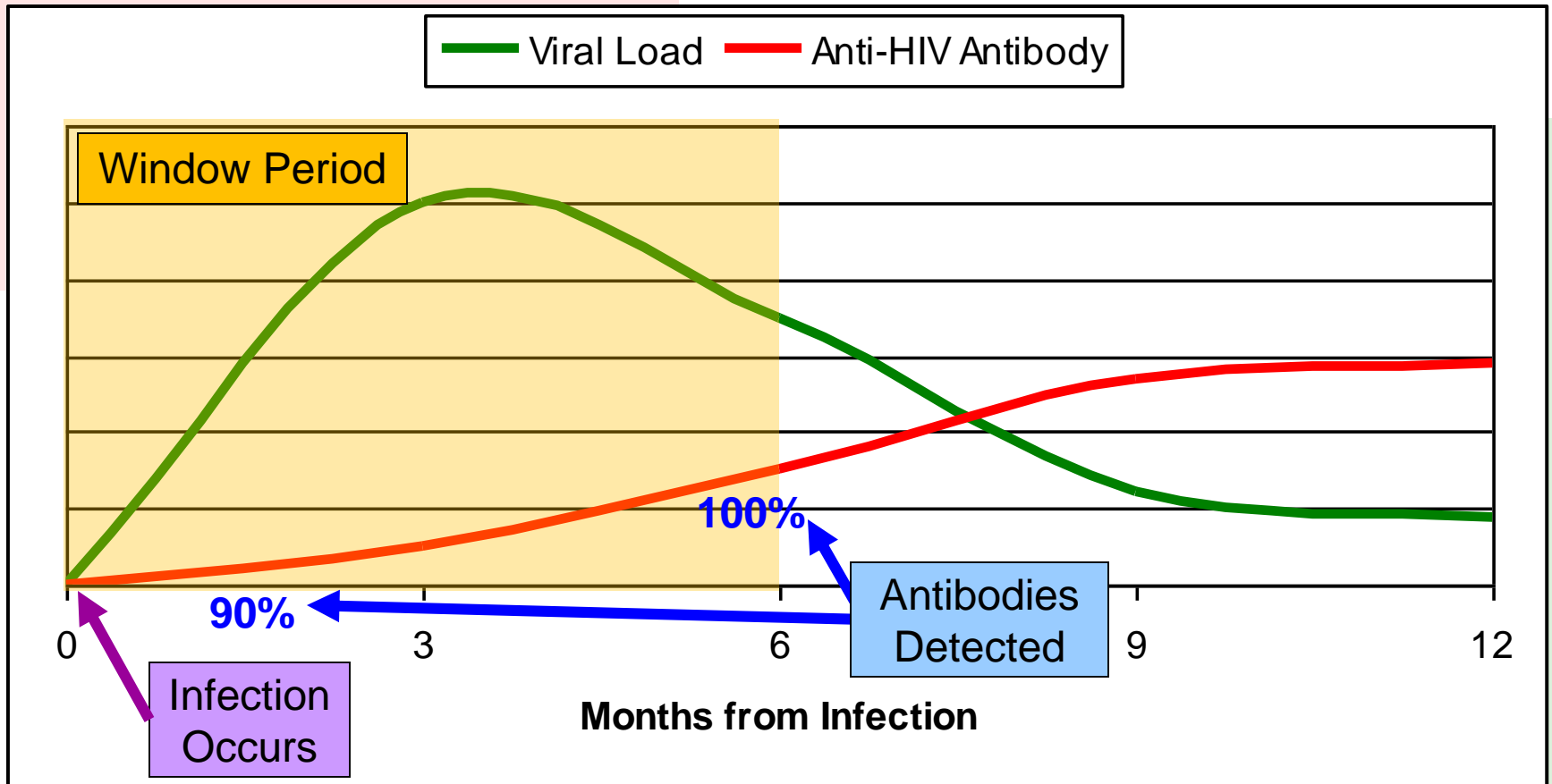
What can be done to reduce risk

- Abstinence
- Use barriers, such as condoms and dental dams
- Limit the number of sexual partners
- Do not share needles used by others, such as for drug use, tattooing, or piercing
- Avoid exposure to blood products

HIV Testing

- Screening tests
 - Orasure: detects HIV antibodies in oral fluid
 - Rapid test: detects HIV antibodies in blood from finger prick
- Confirmatory tests
 - IFA: highly accurate detection of HIV antibodies from venous blood
 - Western blot: very specific detection of HIV antibodies from venous blood

Window Period



HIV Testing in ND

- Confidential
- Free to at-risk individuals
- Rapid test results available within 20 minutes
- OraSure results available within one week
- Testing sites located throughout the state
- List of testing sites at www.ndhealth.gov/hiv or 1.800.70.NDHIV

ND HIV Testing Laws

- Must have informed consent before testing, except for . . .
 - Mandatory testing of prison/jail inmates if incarcerated for more than 15 days, and
 - Mandatory testing of defendants charged with a sex offense
 - Source of occupational exposure
- Children age 14 or older may be tested without parental consent

HIV/AIDS Treatment



HIV/AIDS Treatment

- Highly Active Anti-Retroviral Treatment (HAART) includes at least 3 drugs. This is to reduce the likelihood of development of drug resistance.
- There can be many, tough side effects to the drugs.
- \$\$\$
- More than 20 different antiretroviral (ARV) drugs, though not all are licensed or available in every country

HIV/AIDS Treatment

- As the virus cannot be completely removed, treatment lasts the rest of life.
- Standard treatment plans include testing of CD4 lymphocytes and viral load to detect disease progression.
- Drugs aim to keep the viral load at a minimum.
- Stopping treatment often results in a quick jump in viral load.

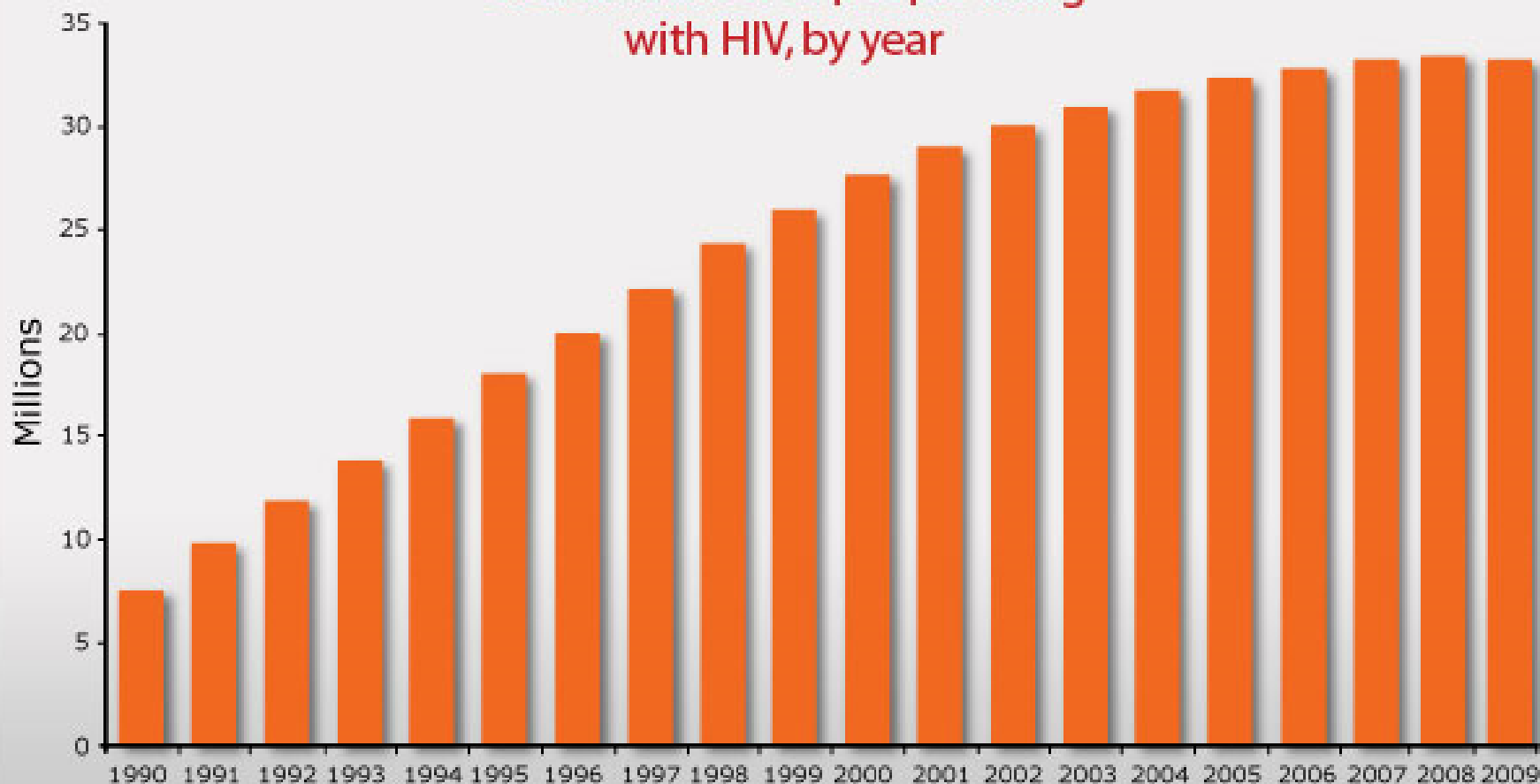
Some HIV/AIDS Statistics

Worldwide HIV/AIDS Statistics

- 33.4 million people were estimated to be living with HIV in 2008
- 2.7 million people were estimated to be newly infected with HIV during 2008
- An estimated 2 million people died of AIDS during 2008

HIV Worldwide, 1990-2009

Global number of people living
with HIV, by year

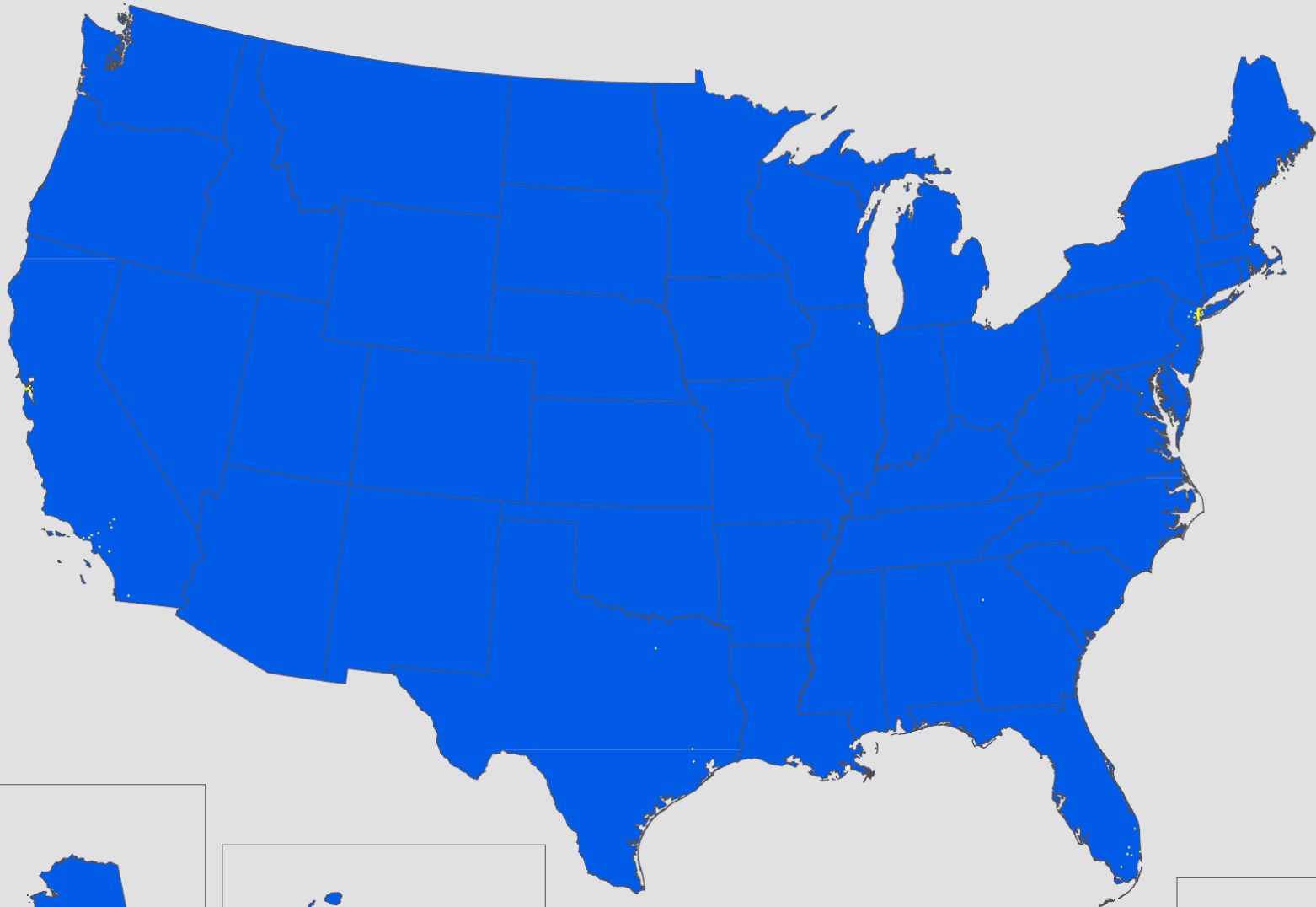


U.S. HIV/AIDS Statistics

- By the end of 2008, 1,073,128 people had been diagnosed with AIDS in the 50 states and the District of Columbia.
- By the end of 2007, 470,902 of these cases were still living, and 597,499 of them had died.
- The CDC estimates that 56,300 people were newly infected with HIV during 2008.

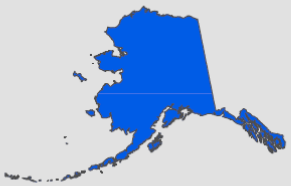
Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 1983 N = 4,782



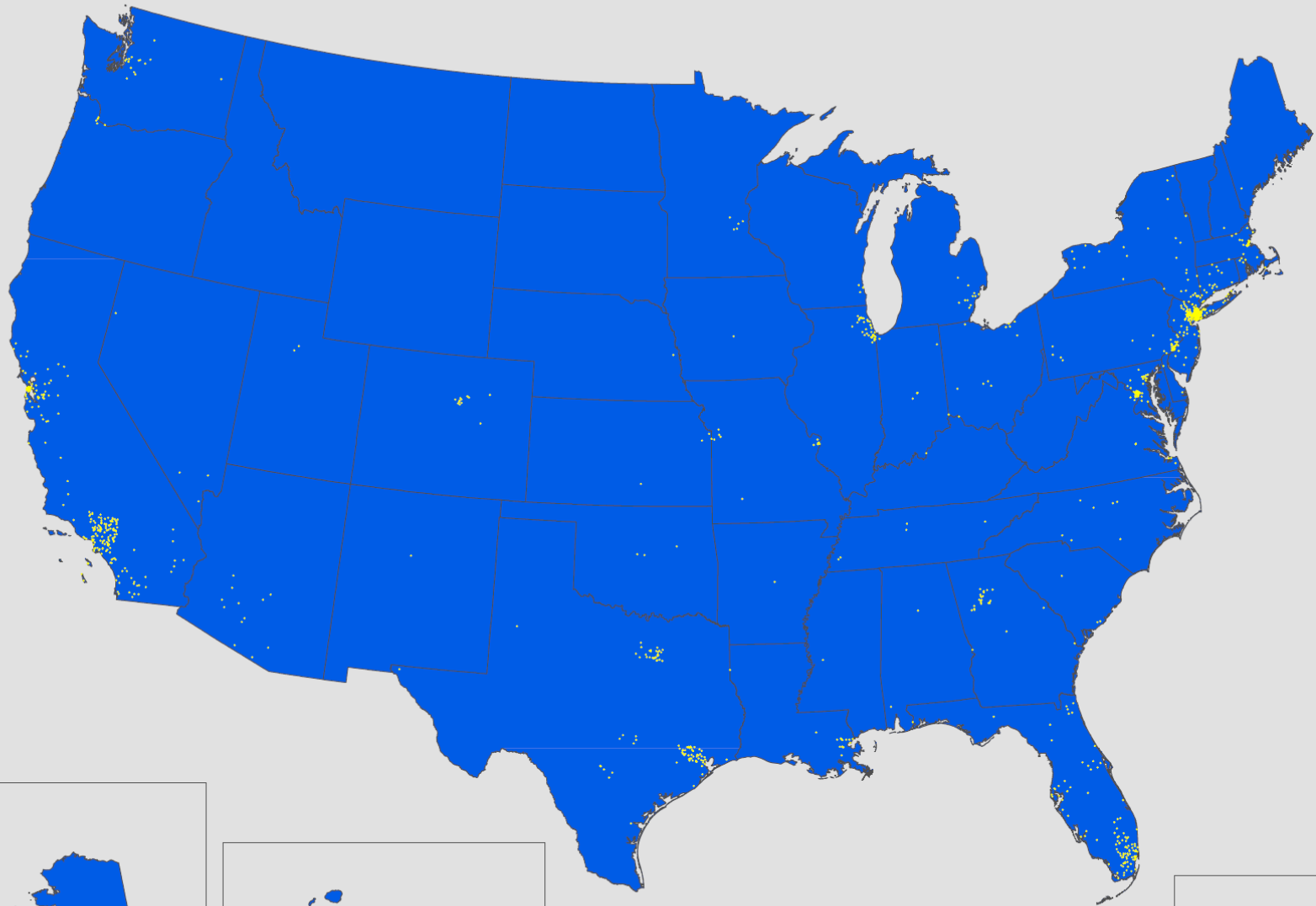
Each Dot Represents 50 Cases

Note. Data have been adjusted for reporting delays. Data are presented for AIDS cases reported to CDC through June 2007. All data are provisional.



Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 1987 N = 71,136

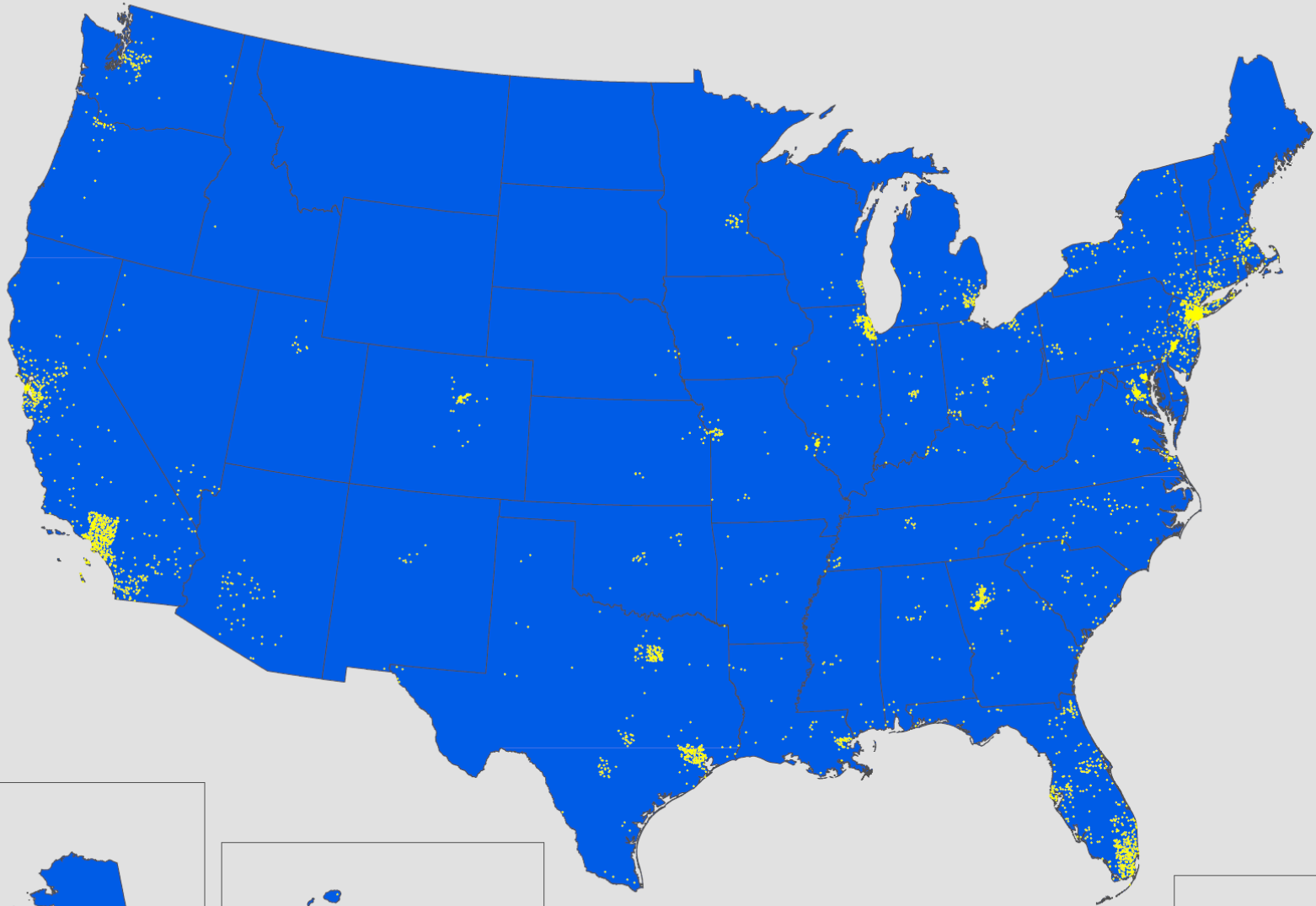


Each Dot Represents 50 Cases

Note. Data have been adjusted for reporting delays. Data are presented for AIDS cases reported to CDC through June 2007. All data are provisional.

Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 1991 N = 257,674



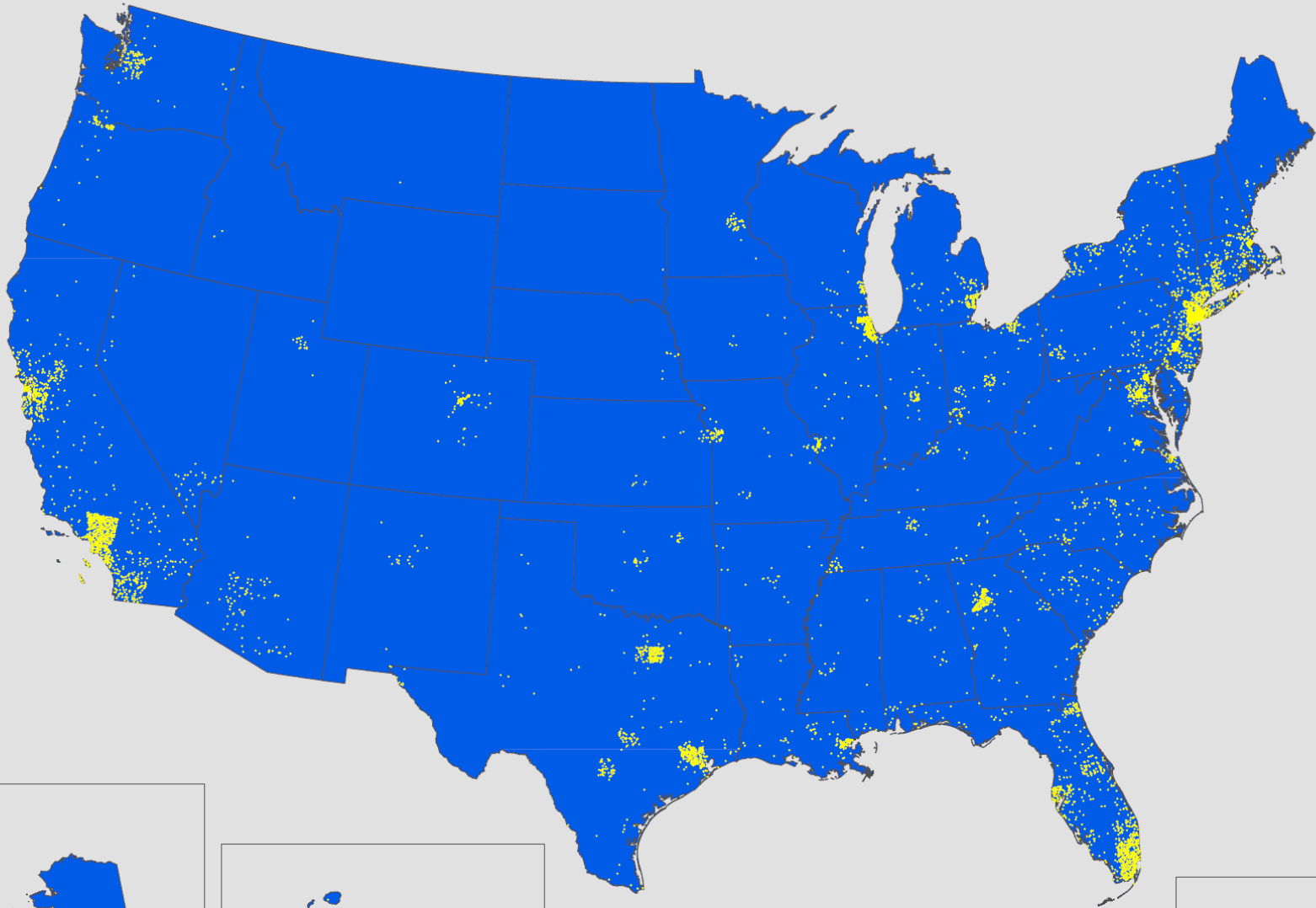
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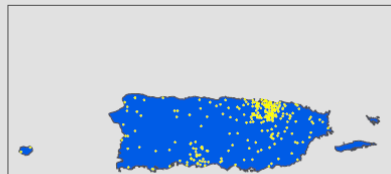
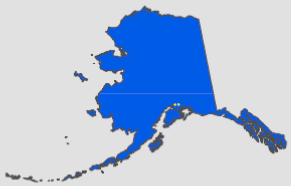
Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 1993 N = 413,102



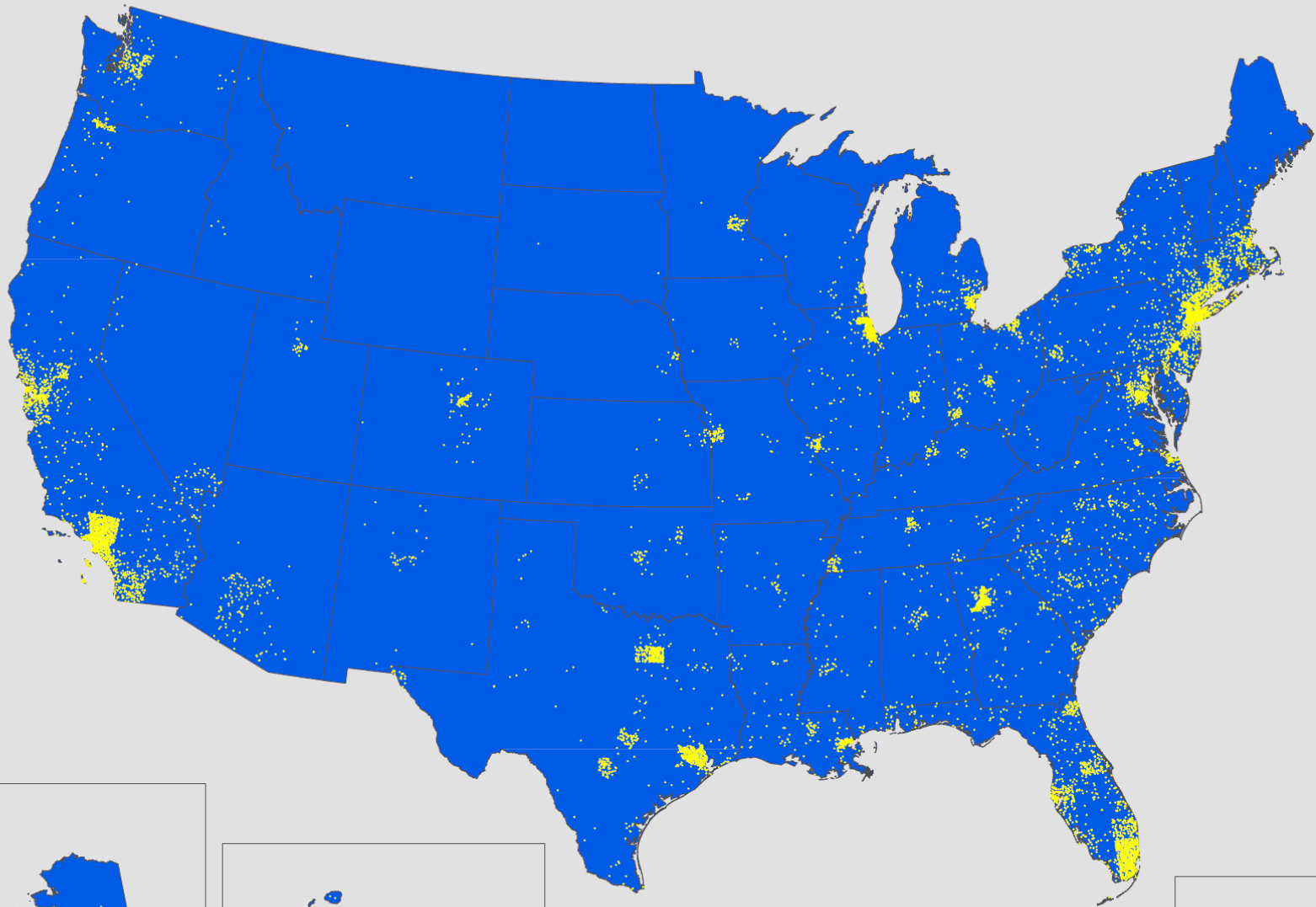
Each Dot Represents 50 Cases

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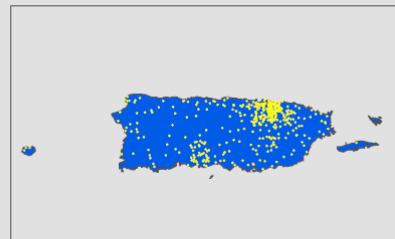
Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 1997 N = 660,102



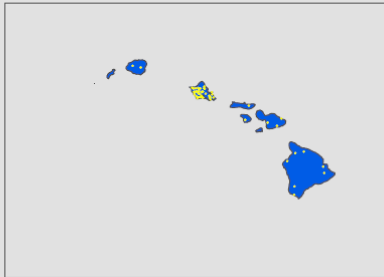
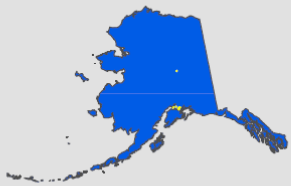
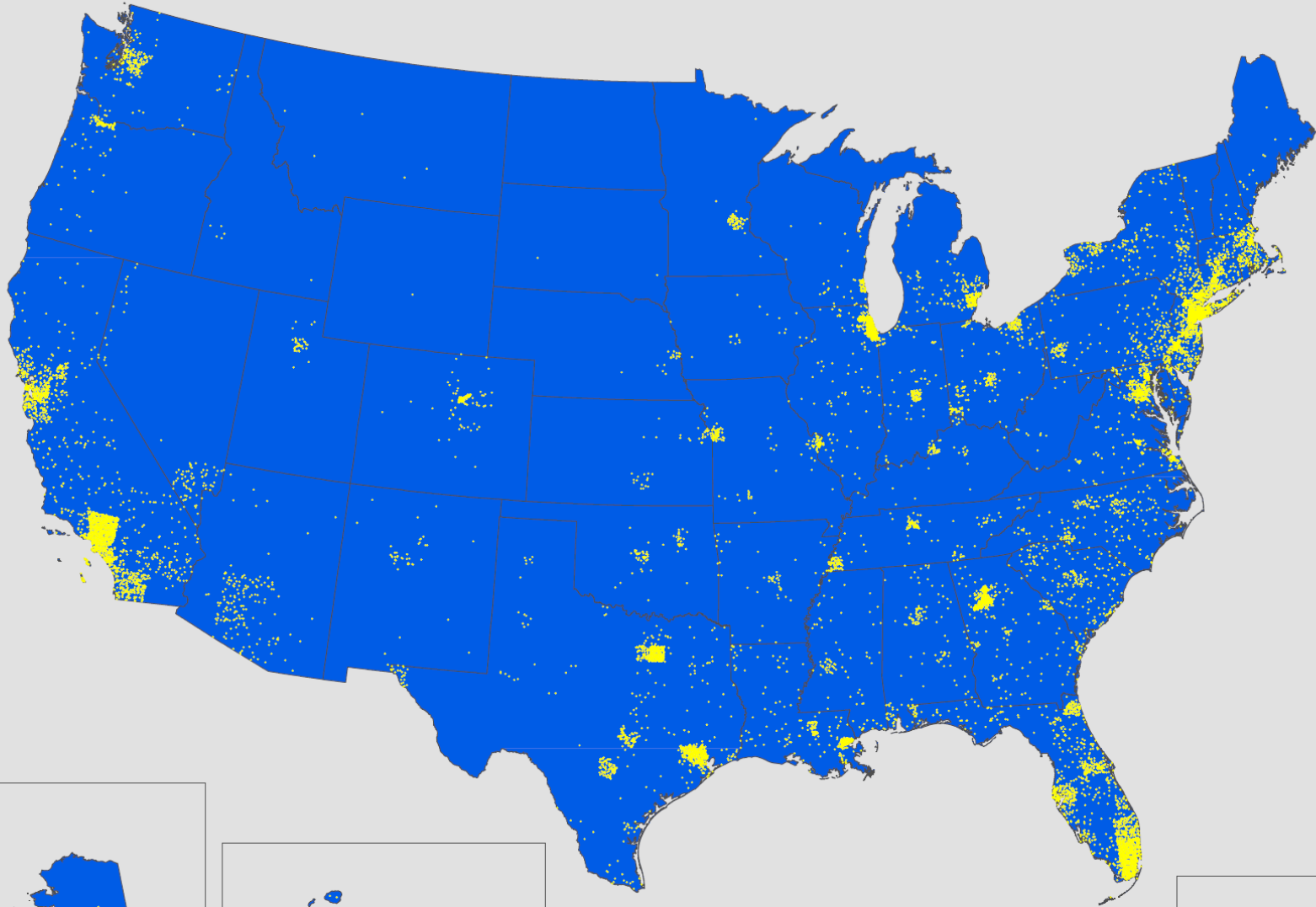
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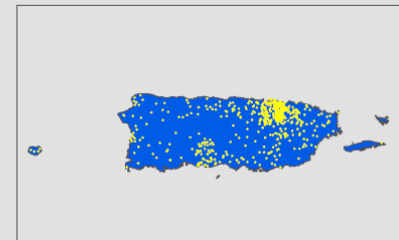
Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 2001 N = 820,513



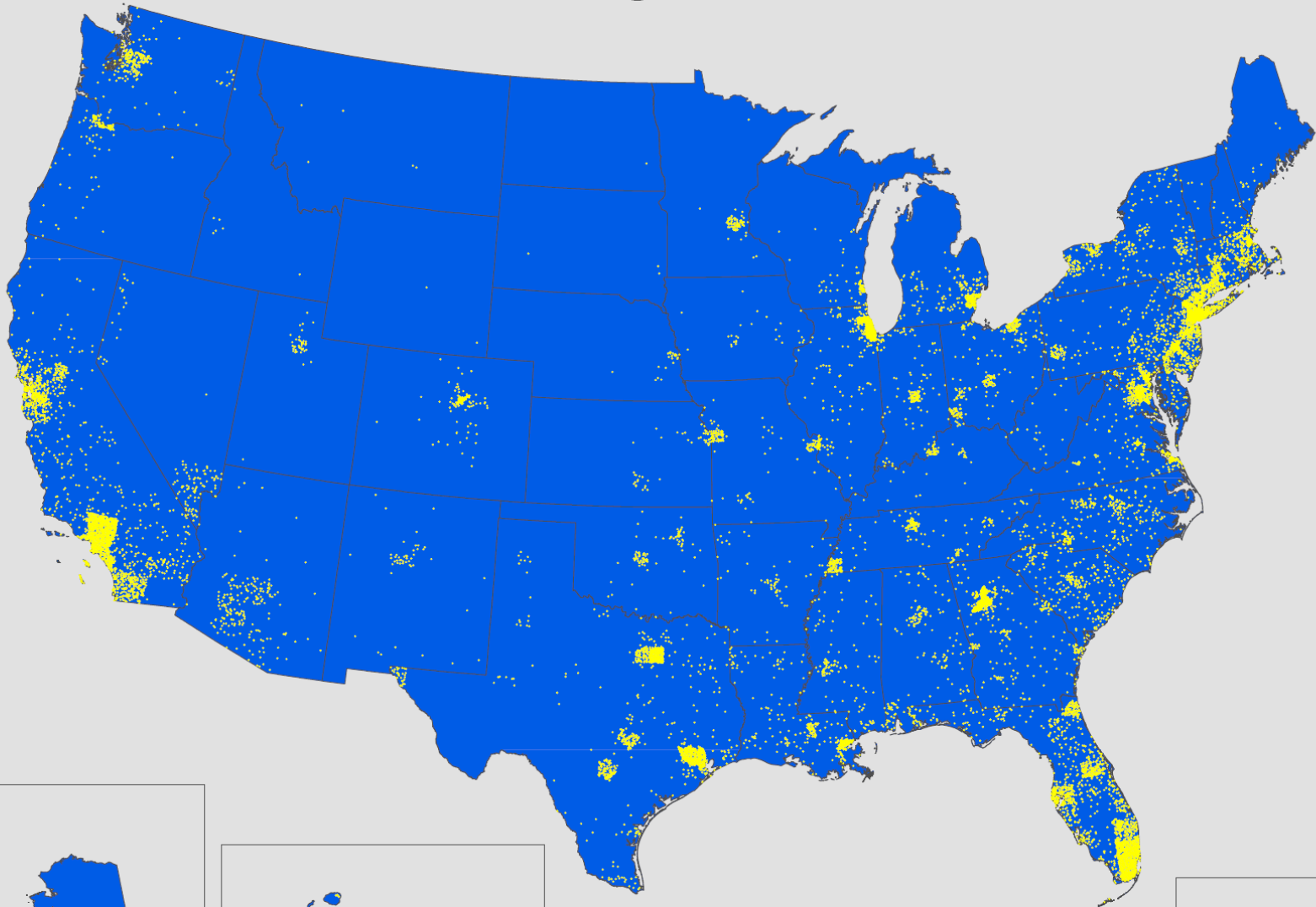
Each Dot Represents 50 Cases

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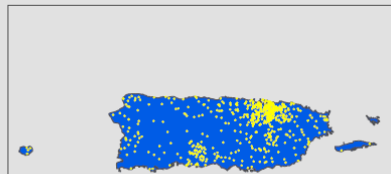
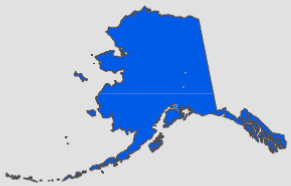
Estimated AIDS Cases in the United States and Puerto Rico

Cumulative through 2005 N = 975,350

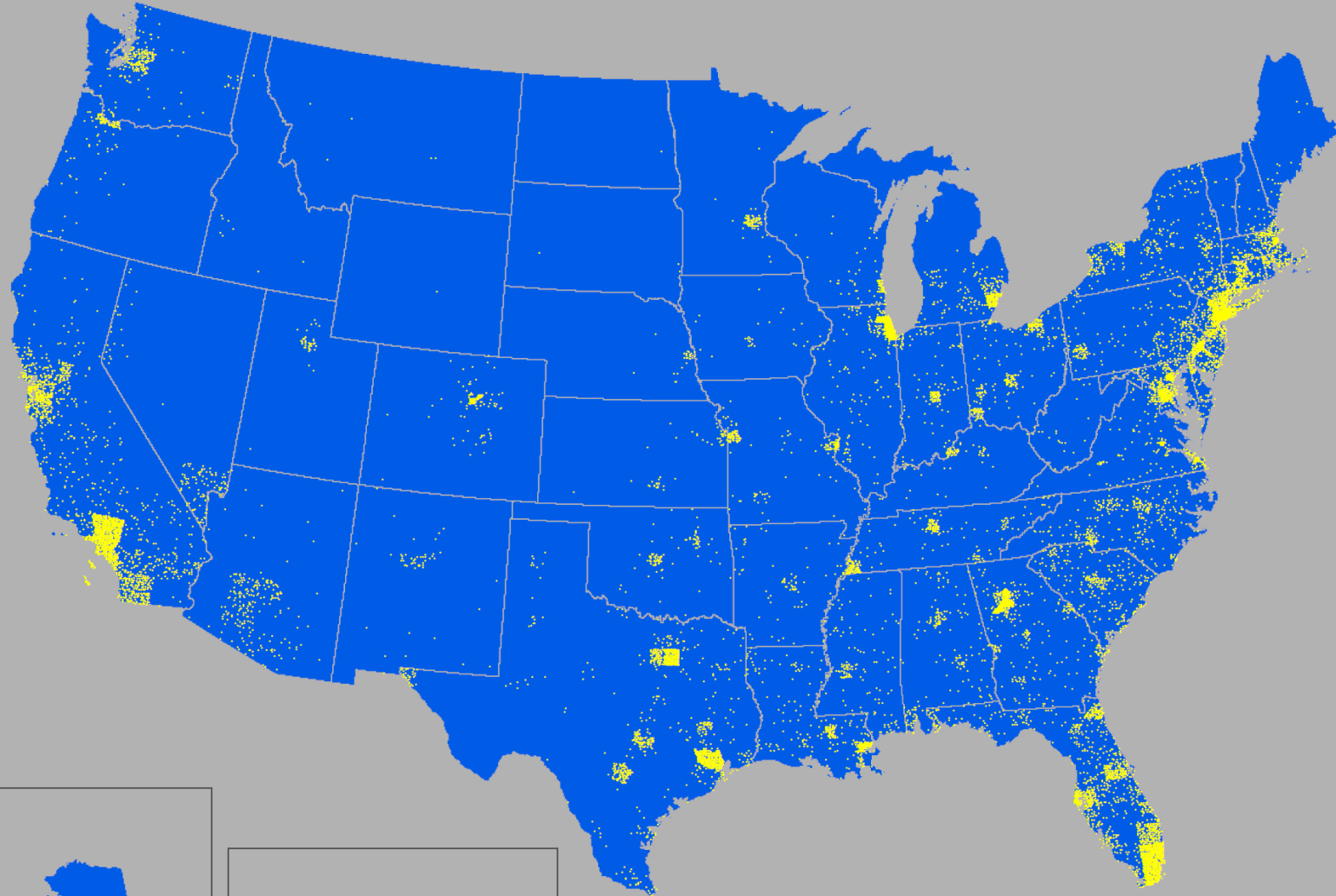


Each Dot Represents 50 Cases

Note. Data have been adjusted for reporting delays. Data are presented for AIDS cases reported to CDC through June 2007. All data are provisional.

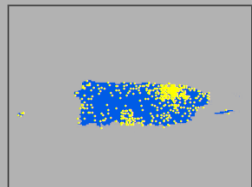


Estimated AIDS Cases in the United States and Puerto Rico Cumulative through 2007 N = 1,049,714

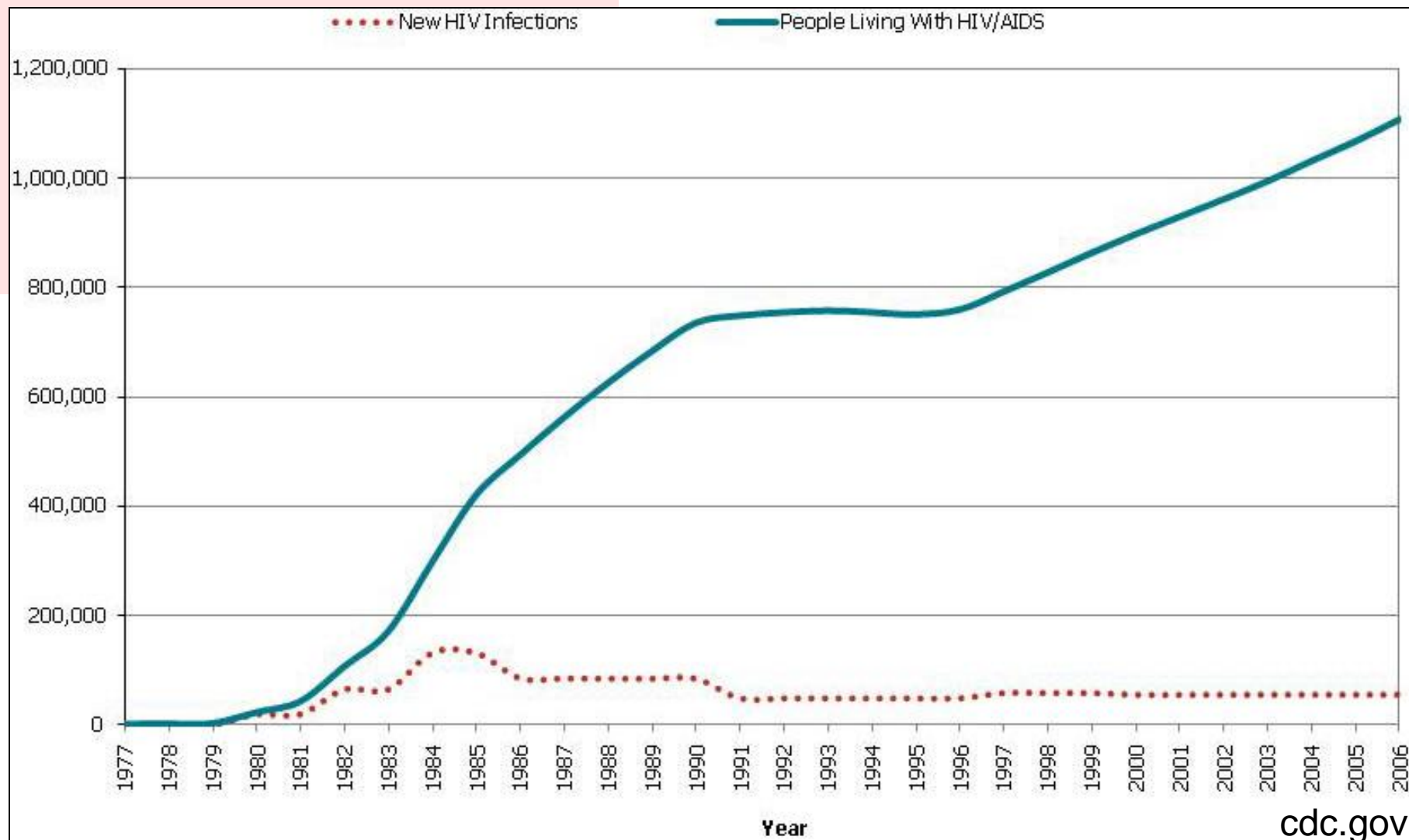


Each Dot Represents 50 Cases

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Data are presented for AIDS cases reported to CDC
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HIV in the United States, 1977-2006

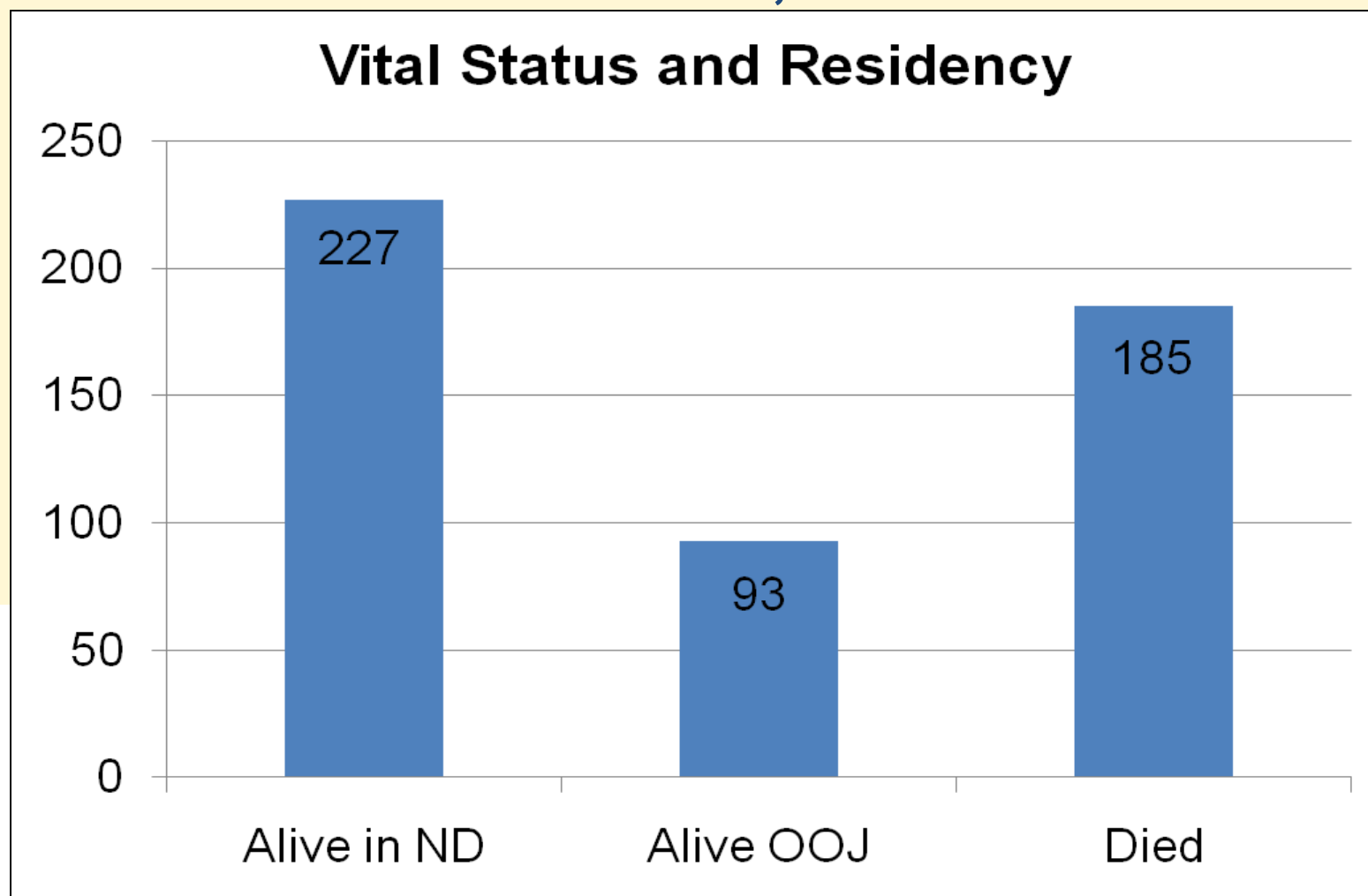


North Dakota HIV/AIDS Statistics

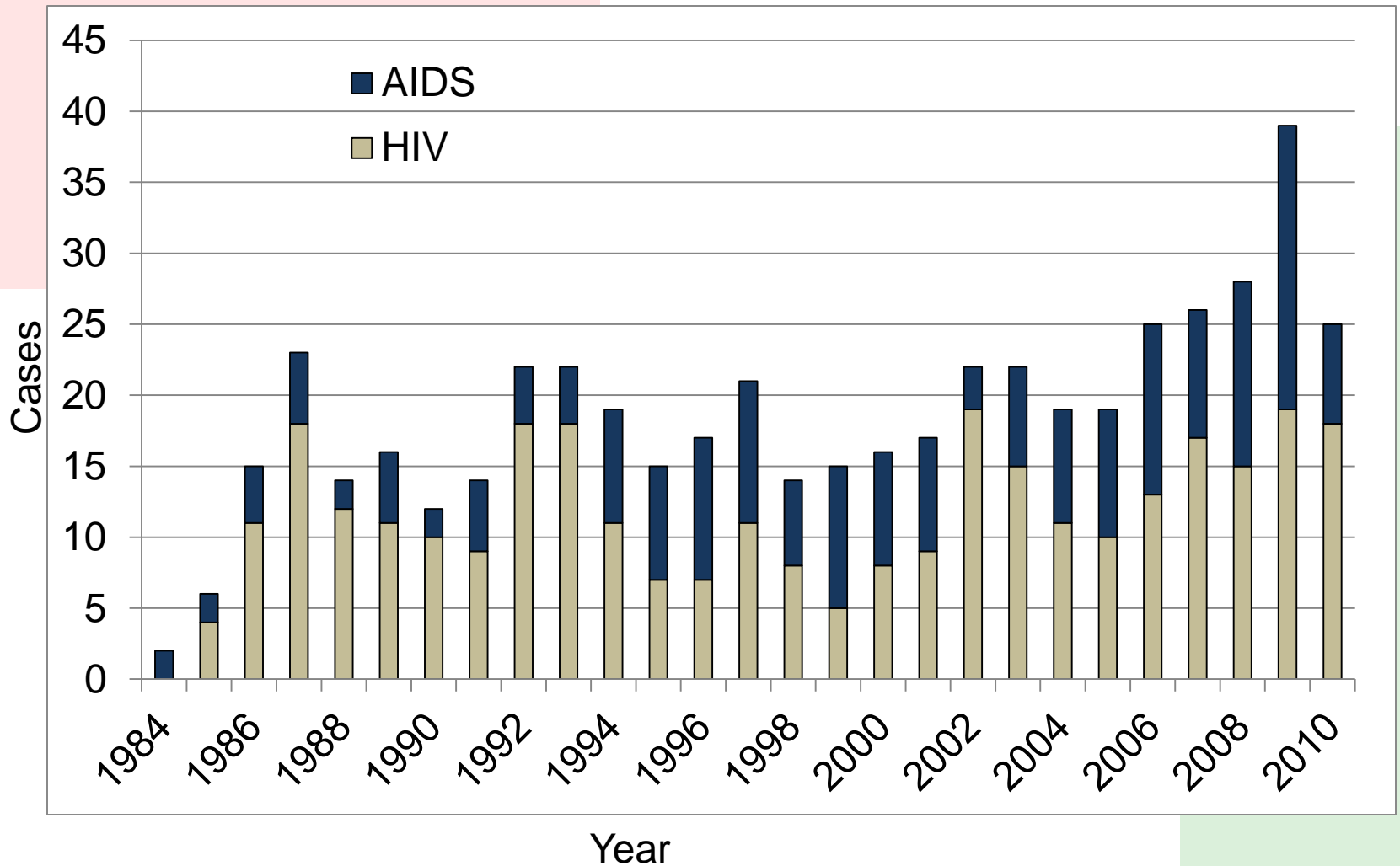
As of December 31, 2010

- 505 Cumulative cases since 1984
- 227 are known to still be living in ND
- Of the 227:
 - 38% have been initially diagnosed with AIDS
 - 83% are male
 - 73% are white, 12% are black, and 10% are American Indian
 - 51% are men who have sex with men (MSM), 20% had heterosexual relations, and 12% used injecting drugs (IDU)

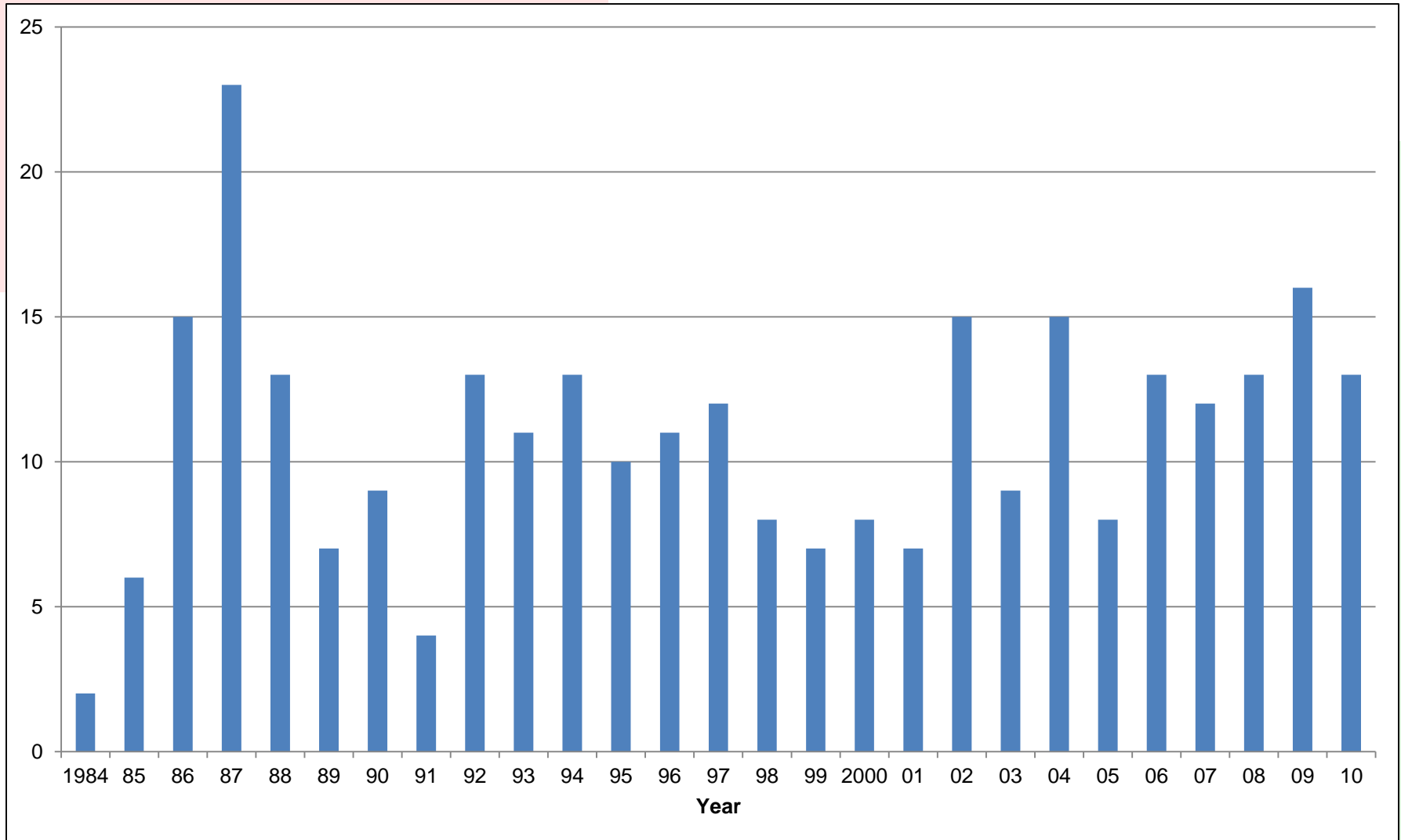
Cumulative HIV/AIDS Cases as of 12/31/2010, n=505



Annual Number of HIV/AIDS Cases Reported in ND, 1984-2010, n=505



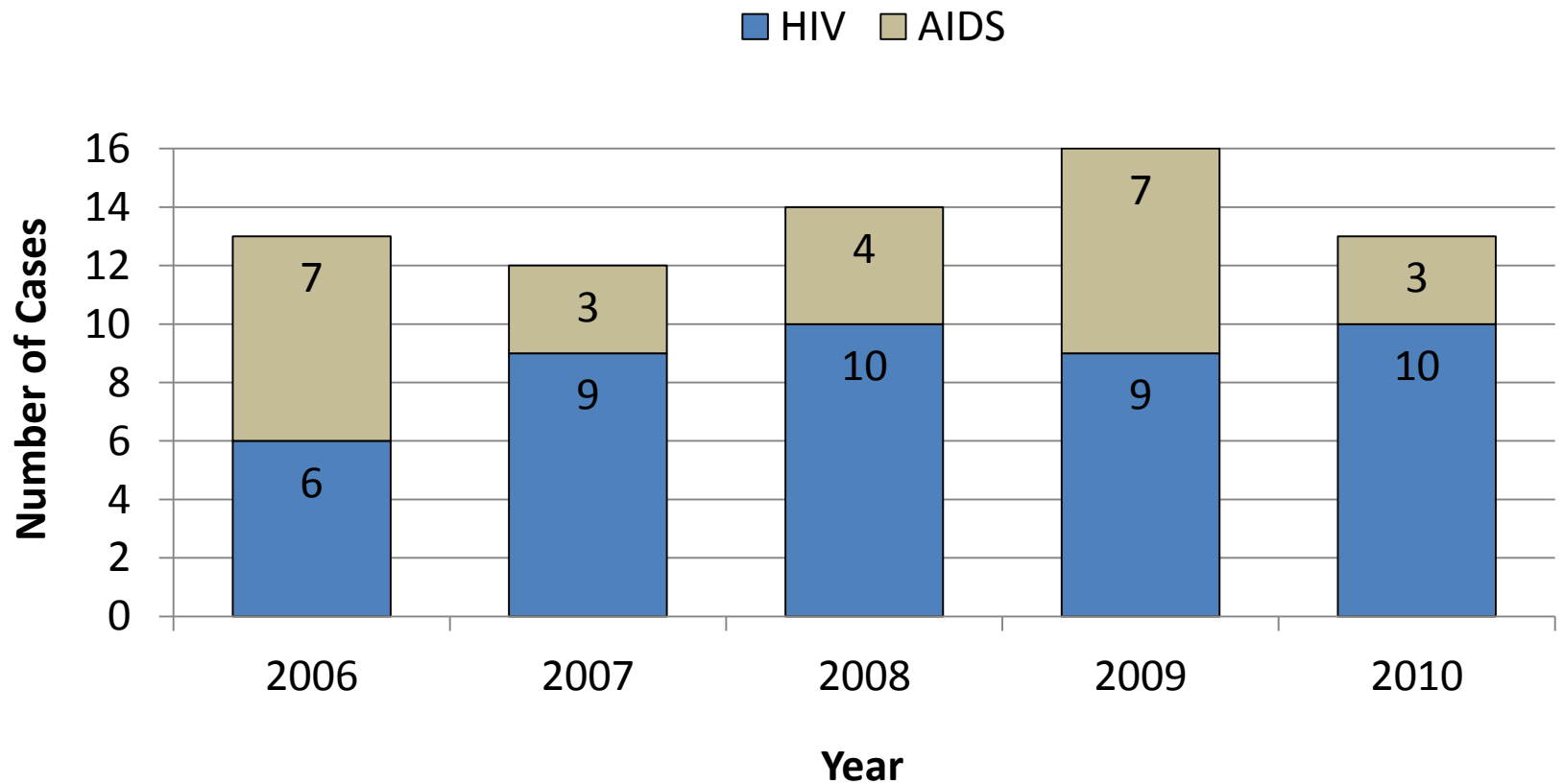
Newly Dx HIV/AIDS Cases Reported in ND, 1984-2011, n=293



HIV/AIDS Annual Incidence

- North Dakota Incidence = $(10 / 650,000) * 100,000$
~ 1.5 cases / 100,000
- United States Incidence = $(55,000 / 307 \text{ million}) * 100,000$
~ 17.9 cases / 100,000
- Worldwide Incidence = $(2.6 \text{ million} / 7 \text{ billion}) * 100,000$
~ 37.1 cases / 100,000

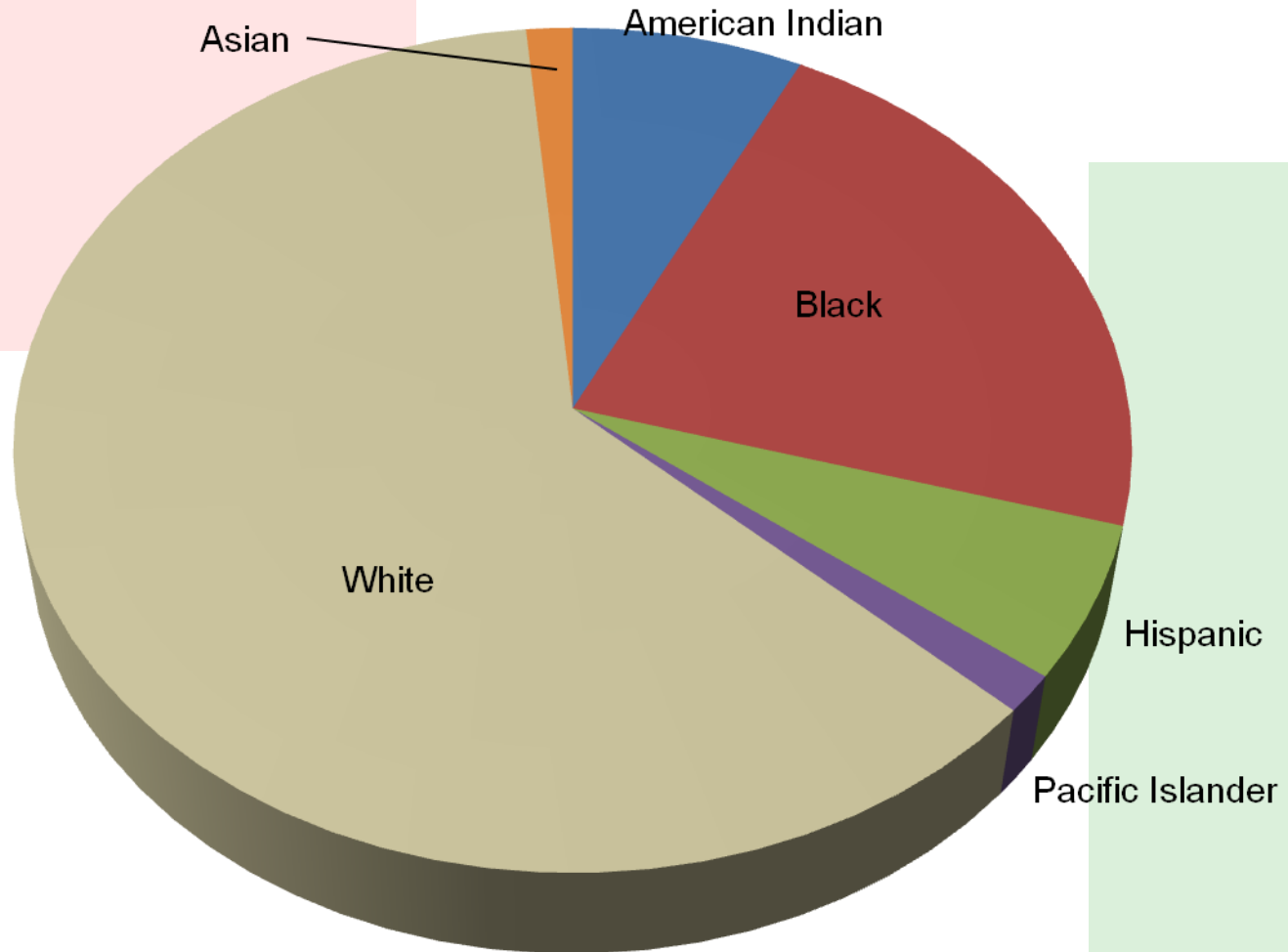
Annual Number of New HIV/AIDS Diagnoses in ND, 2006-2010, n=68



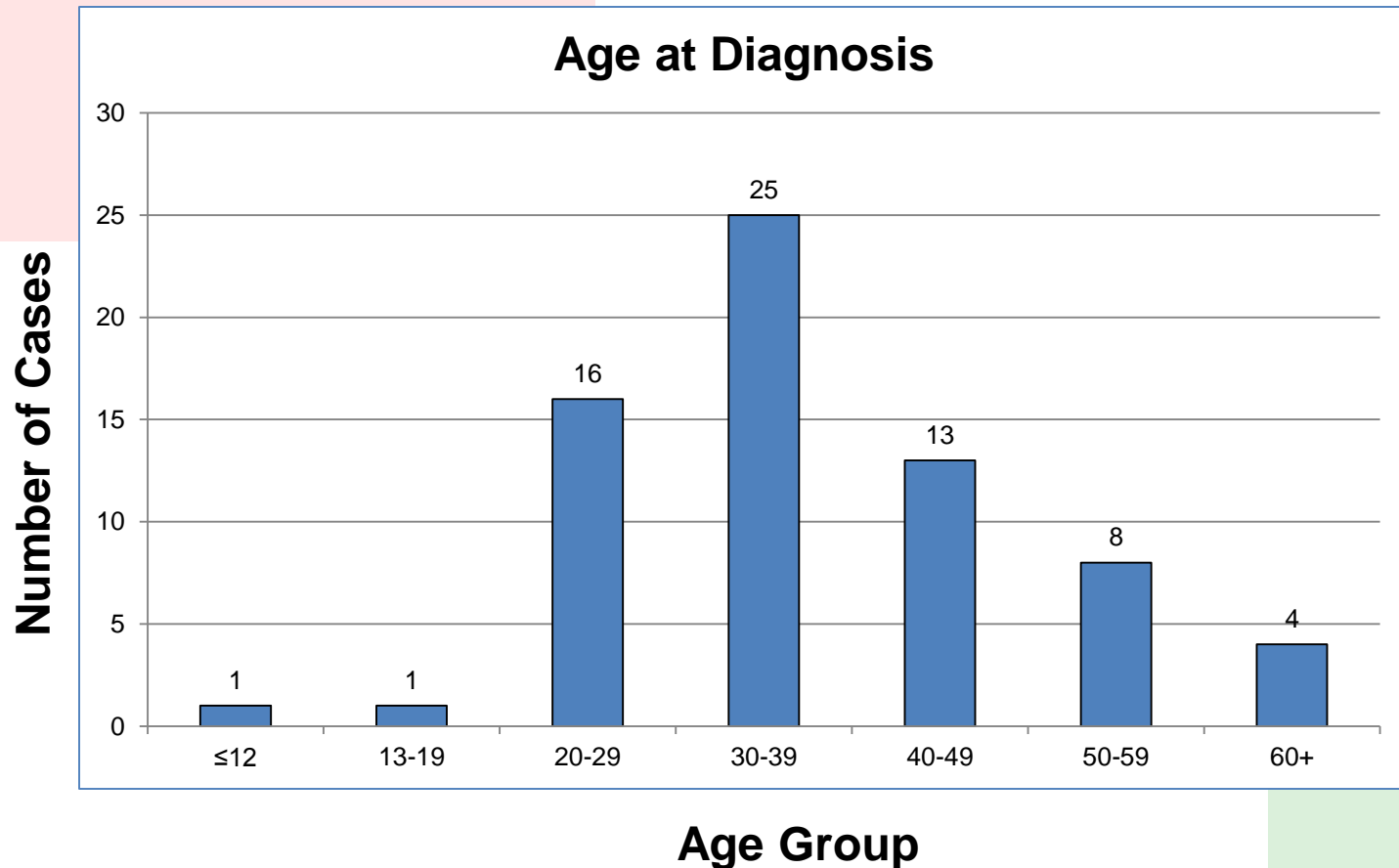
New HIV/AIDS Diagnoses in ND by Gender, 2006-2010, n=68



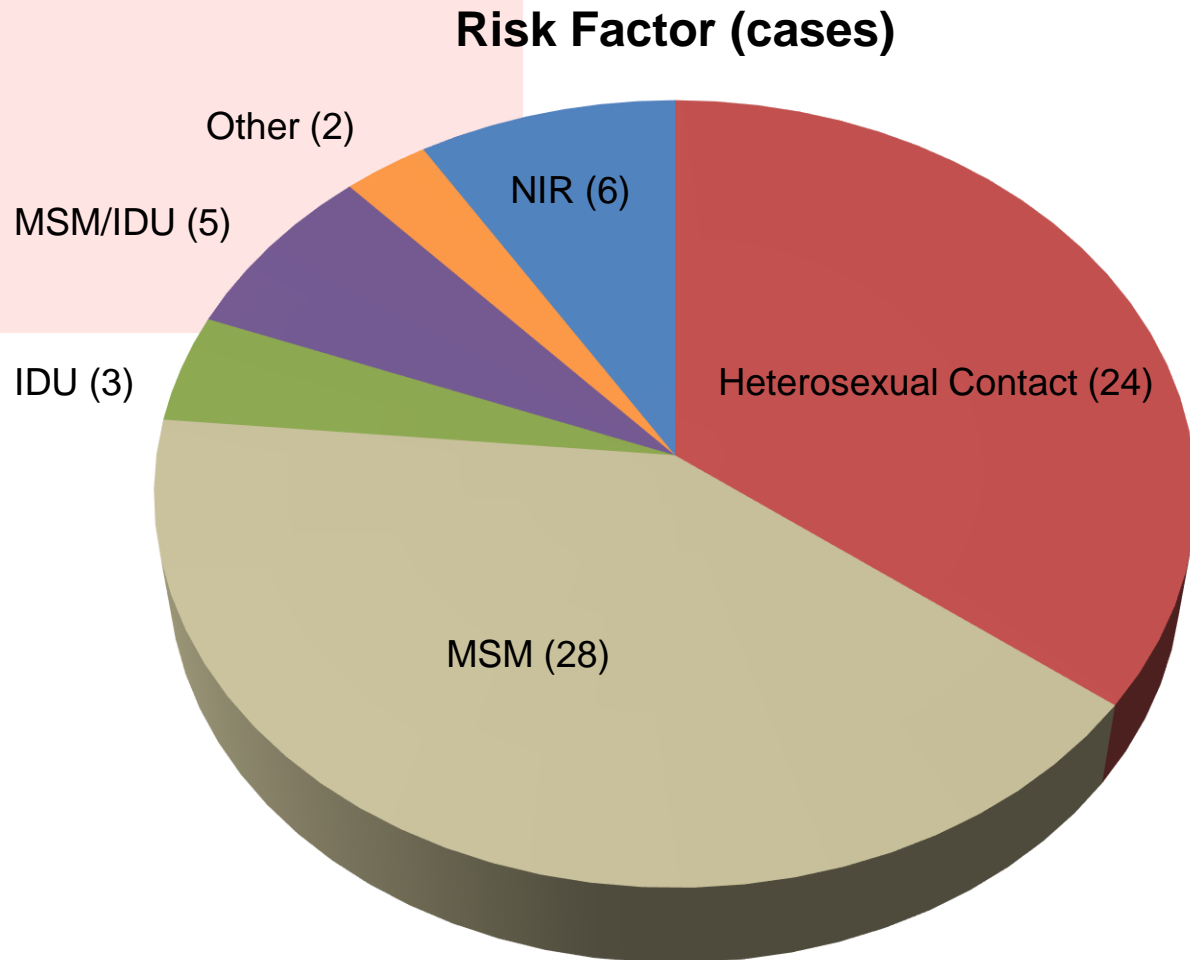
New HIV/AIDS Diagnoses in ND by Race/Ethnicity, 2006-2010, n=68



New HIV/AIDS Diagnoses in ND by Age Group, 2006-2010, n=68




Risk Factors Identified by New HIV/AIDS Diagnoses, 2006-2010, n=68



HIV/AIDS in ND, 2011

So far...

- 27 newly reported cases.
- 8 of the 27 are newly diagnosed



Future of HIV/AIDS And HIV/AIDS in the News

Effectiveness and Safety of Tenofovir Gel, an Antiretroviral Microbicide for the Prevention of HIV Infection in Women

Science Magazine

July 19th, 2010

Volume 329, No. 5996

<http://www.sciencemag.org/content/329/5996/1168.abstract>

Tenofovir Gel Study

- Centre for the AIDS Program of Research in South Africa (CAPRISA)
- 989 sexually active, HIV-negative women were enrolled
- Women were enrolled in either the Tenofovir group (topical gel for the vagina) or placebo group
- With significant results, Tenofovir gel reduced HIV acquisition by an estimated 39% overall, and by 54% in women with high gel adherence.

Tenofovir Gel Study

What do these findings mean?

- More studies to confirm these results and similar studies to follow
- Women have another tool to use in cases where mutual monogamy does not exist or is unknown; also useful in situations where condom use is not possible/condom use is refused

United States lifts travel ban

On July 4th, 2010, the United States lifted a ban preventing people from traveling to the country based on their HIV status.

Legislation for this ban had been in place since 1989.

South Korea, China and Namibia also lifted similar bans.

More Young People Practicing Abstinence

Reported March 7, 2011, a 2006-2008 study showed 29% women and 27% men aged 15-24 years as abstaining from sex.

In 2002, 22% reported abstaining from sex from a similar study.

Questions?

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1.800.70.NDHIV

www.ndhealth.gov/hiv